Implementation of MRV in District Cooling Projects

Guangzhou Pearl River New Town Energy Co., Ltd.
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Lecturer: Mr. TENG LIN

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1. **Project introduction**

2. **Implementation plan of MRV**

3. **Existing problems and solutions**

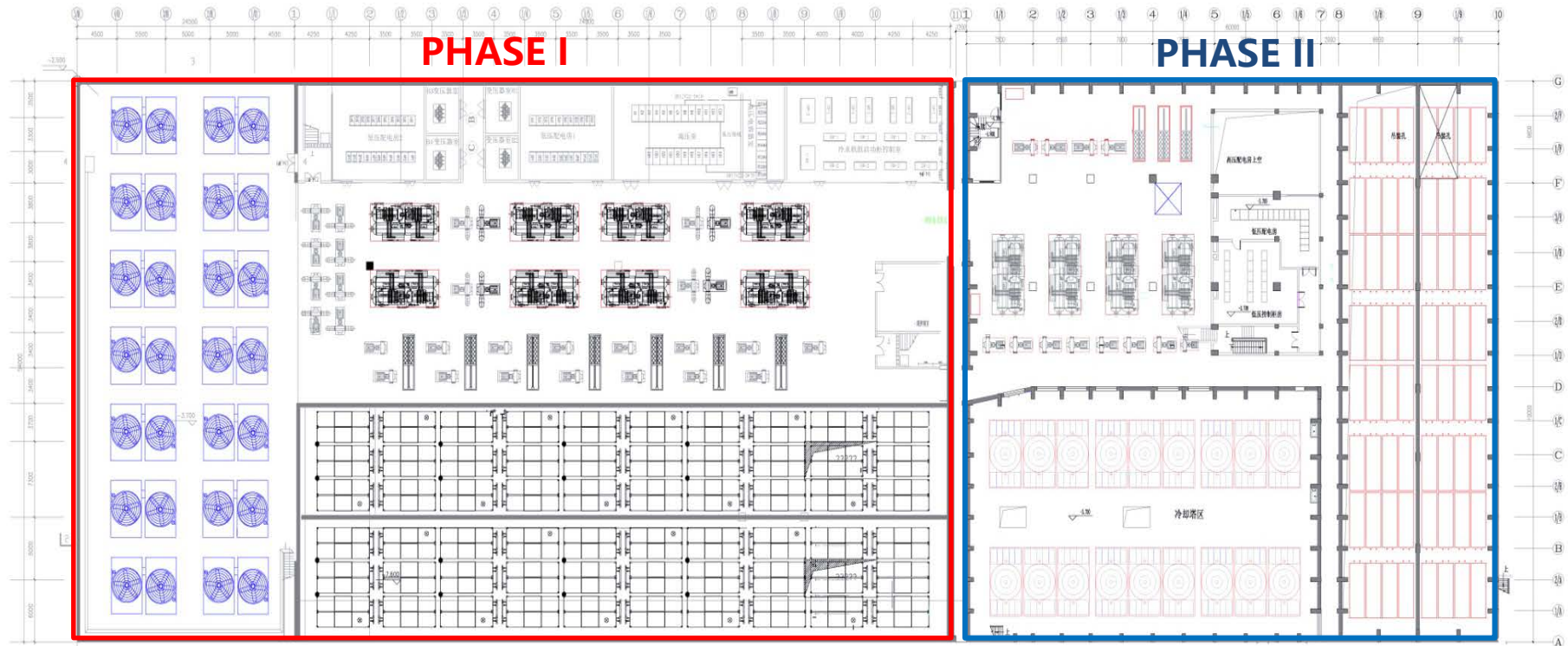2 mil M² of gross floor area in use, total cooling capacity: 40,000 RT

Floor Plan of the district cooling plant

PHASE I PHASE II

	Land Area	Construction Area	Capacity	Time of Construction	Time of Operation
Phase I	7,000 M²	6,300 M²	25,000RT	2008.07	2010.03
Phase II	3,000 M²	2,700 M²	15,000RT	2015.11	2018.03
Total	**10,000 M²**	**9,000 M²**	**40,000RT**		

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1.   Ice storage technology

2.   Large temperature difference(1.5 °C/11 °C)

3.   Variable frequency motor actuated Pumps & cooling tower

4.   Load prediction and energy consumption control software
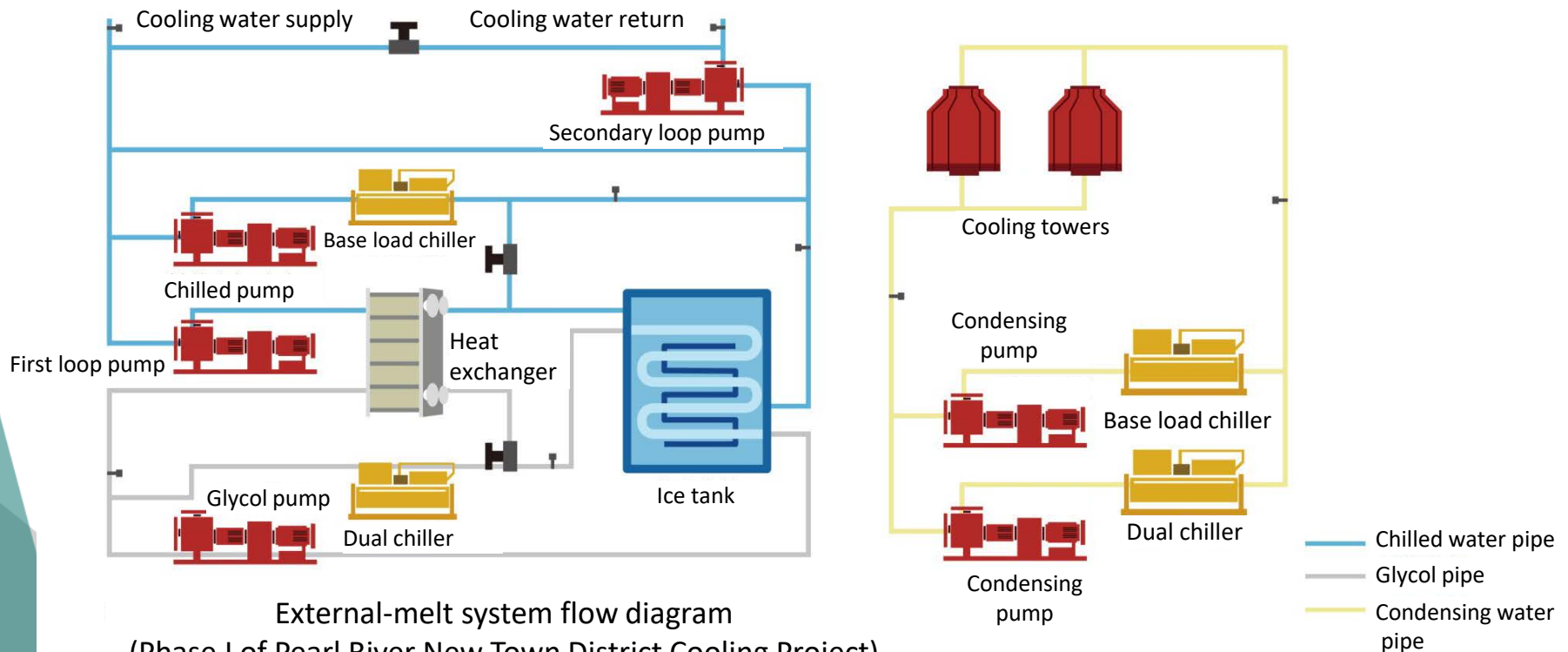
External-melt system flow diagram
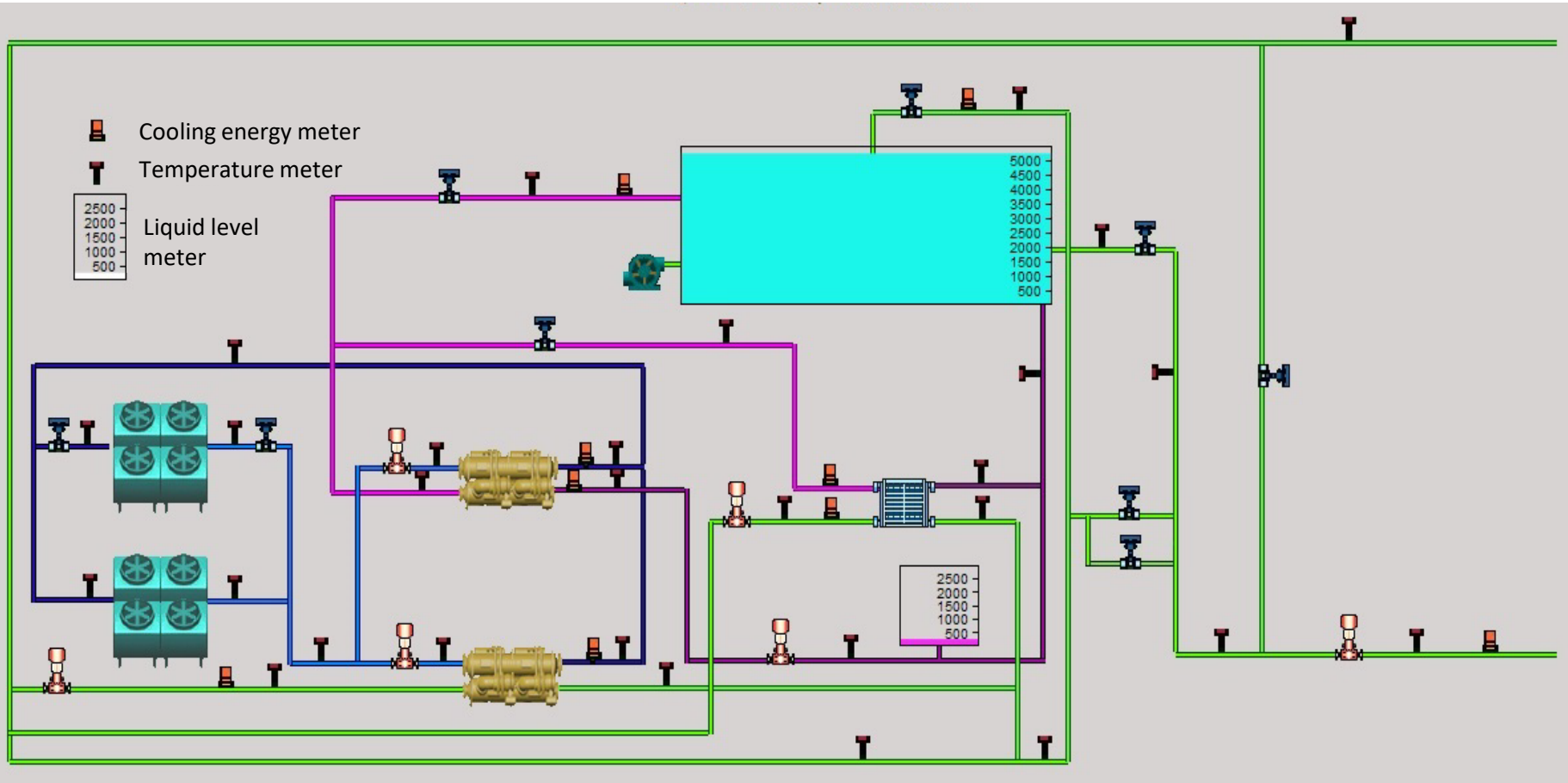(Phase I of Pearl River New Town District Cooling Project)

1. Setting up sensors for every single equipment till it is easy to fulfill onsite performance test of each energy consumption equipment. ---- complete and detailed

2. All operation data should be directly acquired from instrument but not figured out by calculating from a total amount. ---- precise

3. Data acquisition unit installed at scene should have basic data storage capacity, to avoid data loss from short-term communication blackout. ---- stable

4. Firewall and data safety management system should be established, and real-time data remote storage facility is suggested to be built, to guarantee data safety. ---- safe
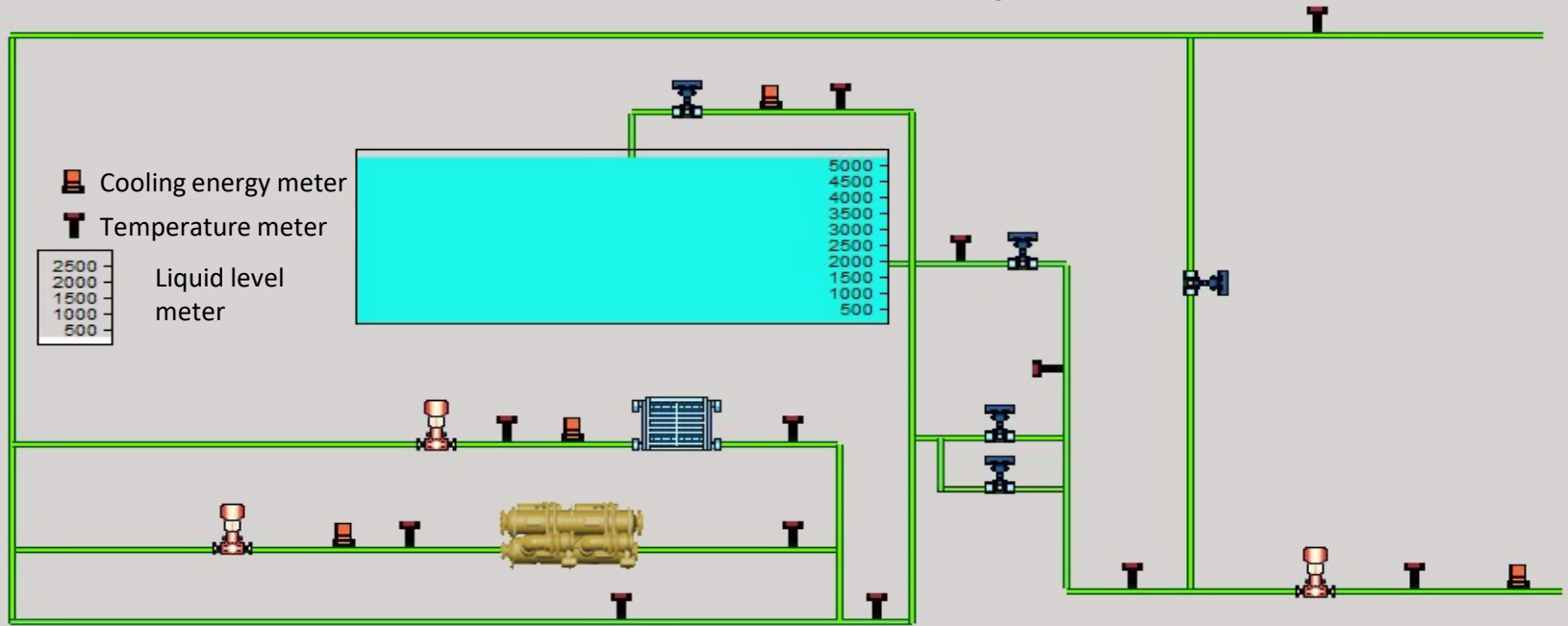
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Flow diagram of Ice storage cooling system

Chilled water circulation system

Cooling energy meter

Temperature meter

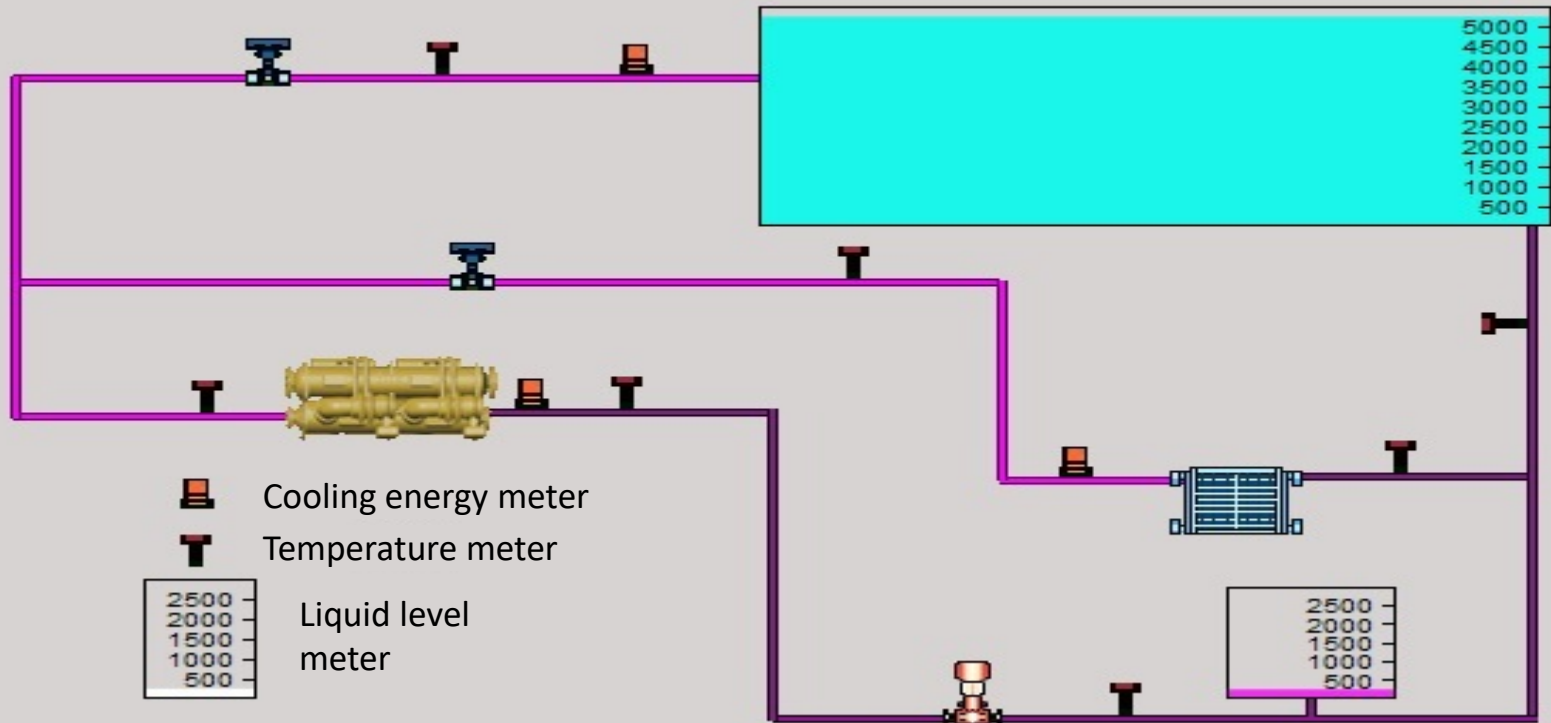Liquid level meter

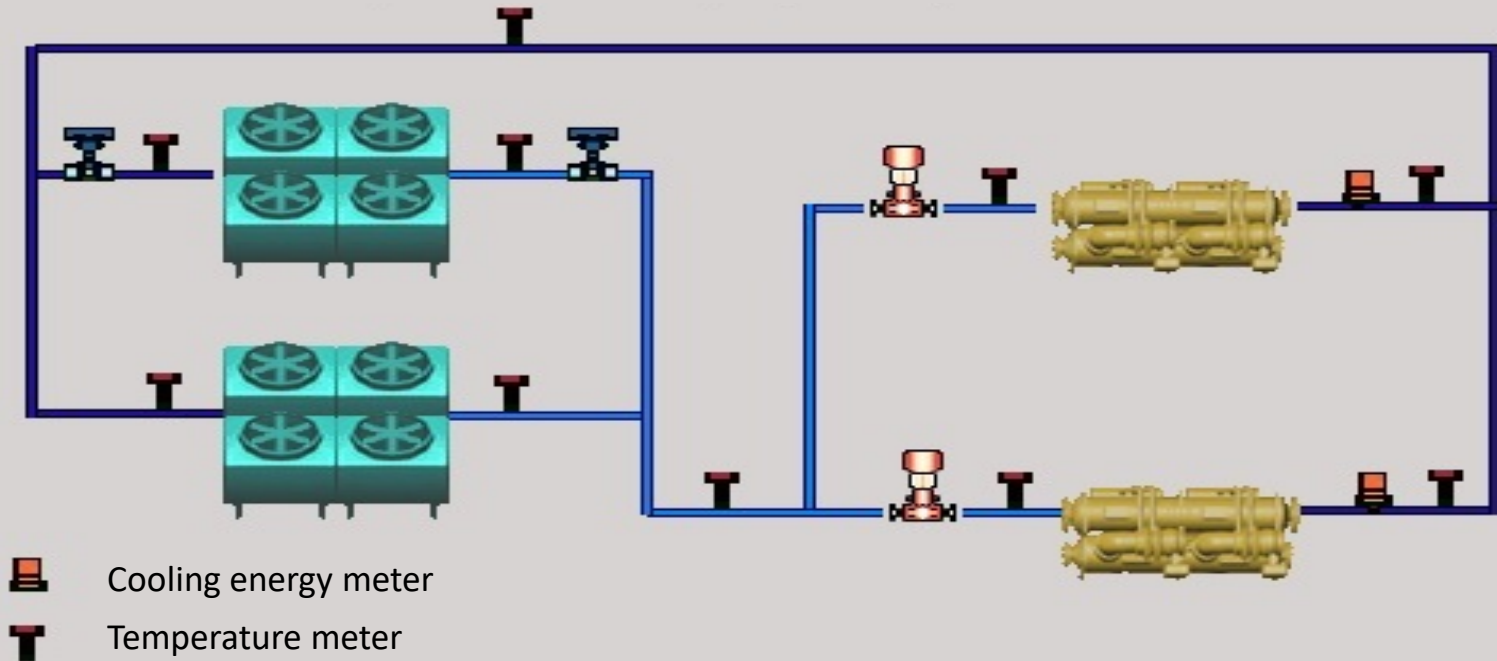| Name of Equipment	Sensors in service
Ice storage tank	Liquid level sensor, ice sickness sensor, load transducer, energy meter
Cooling water pump	Differential pressure transducer
First loop pump	Differential pressure transducer
Secondary loop pump	Differential pressure transducer
Heat exchanger	Water temperature sensor, energy meter

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Glycol Circulation System

Name of Equipment	Sensors in service
Dual chiller	Differential pressure transducer, Water temperature sensor, energy meter
Glycol pump	Differential pressure transducer
Glycol storage tank	Liquid level sensor

Legend:
- Cooling energy meter
- Temperature meter
- Liquid level meter

Condensing water circulation system

■ Cooling energy meter

▼ Temperature meter

Name of Equipment	Sensors in service
Cooling tower	Water temperature sensor
Base load chiller / Dual chiller	Differential pressure transducer, Water temperature sensor, energy meter
Condensing water pump	Differential pressure transducer

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2、 Implementation plan of MRV – Setups of Sensors

Name of Equipment	Qty. of equipment	Sensors in service
Dual chiller	10	1 differential pressure sensor, 4 water supply and return temperature sensors, 1 cooling energy meter
Base load chiller	2	1 differential pressure sensor, 4 water supply and return temperature sensors, 1 cooling energy meter
Cooling tower	25	2 water supply and return temperature meters
Glycol pump	10	1 differential pressure sensor
Condensing water pump	12	1 differential pressure sensor
Chilled water pump	2	1 differential pressure sensor
First loop pump	7	1 differential pressure sensor
Secondary loop pump	12	1 differential pressure sensor
Heat exchanger	10	2 water supply and return temperature sensors, 1 cooling energy meter
Ice storage tank	4	1 liquid level sensor, 7 ice thickness sensors, 4 load sensors, 1 cooling energy meter
Glycol tank	2	liquid level sensors
Environment surveillance	3	1 temperature & humidity sensor for each set

Totally **361** sets of sensors are installed in cooling system, except for about **2,000** data provided by control panel of different equipment.

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1. Providing onsite performance testing data for equipment.

2. District cooling service fees settlement.

3. Providing support data for optimization of cooling systems operation strategy.

4. Providing support data for equipment maintenance plan for district cooling systems.

5. Providing support data for A/C system energy-saving schemes for our clients.

6. Providing reference for A/C load dimensioning of new district energy projects.

7. Providing basis data for product design optimization for equipment manufacturers.

8. Providing basis data for buildings' A/C load optimization for designing institute.

9. Providing basis data for government authorities to establish buildings' A/C load consumption standards.

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- Bad installation locations of sensors might lead to measurement errors.
  ---- When a pipe system is designed and installed, it is important to give required length of straight pipe for installation of sorts of sensors.

- The accuracy of sensors might go unstable over time.
  ---- Maintenance and calibration should be performed regularly.

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Thank you!

Mr. TENG LIN
Mobile： +86-1380-2908-072
E-mail： et313@139.com

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